

REMARKS

Introduction

In response to the pending Office Action, Applicants have cancelled claims 8, 9 and 20-29, without prejudice, and have amended claims 1, 5 and 14 so as to further clarify the intended subject matter of the present disclosure. In addition, claims 30 and 31 have been added. Finally, the title of the application has also been amended. Support for the amendment and the new claims is found, for example, at FIGS. 3A and 11, and page 19, lines 9-18, page 27, lines 10-14, 23-25 and page 40, lines 7-9 of the present application. No new matter has been introduced.

For at least the reasons set forth below, it is respectfully submitted that all pending claims are now in condition for allowance.

Rejection under 35 U.S.C. § 102

Claims 1-4, 11-14, 16-18, 20 and 21-23 were rejected under 35 U.S.C. § 102 as being anticipated by Misaka (US Pub. No. 2004/0029023 as WO 02/091079). For at least the following reasons, it is respectfully submitted that the pending claims, as amended, are not anticipated by Misaka.

Applicant respectfully submits that amended claim 1 now recites, among other features, that “*the third pattern is located at a distance not larger than a given distance with a transparent portion sandwiched between the first pattern and the third pattern along a direction vertical to the line direction of the first pattern,*” “*no mask pattern is located at a distance not larger than the distance between said first pattern and the third pattern, along a direction vertical to the line direction of the second pattern*” and “*the first line width of the phase shifter in the first pattern is smaller than the second line width of the phase shifter of the second pattern.*” With these

structures, the width of the phase shifter of the mask enhancer structure of the first pattern adjacent to the third pattern (another pattern) at a distance not larger than the given distance is set relatively smaller than that of the second pattern (see, for example, FIG. 3A of the present application). The amount of light (in an identical phase with respect to the transparent portion) rounding to the back side of the first pattern (diffracting light) through the transparent portion disposed around the first pattern can be reduced by the closely disposed third pattern. Accordingly, light (in an opposite phase with respect to the transparent portion) passing through the phase shifter of the first pattern can be reduced. Thus, the shielding property of the first pattern can be sufficiently improved, and hence, an exposure margin increases and contrast in a light intensity distribution formed in the exposure is improved.

In other words, for the photomask including not only an isolated pattern but also complicated patterns closely arranged with one another, the significant effect to increase a process margin can be obtained by employing the mask enhancer structure having *the first line width of the phase shifter in the first pattern being smaller than the second line width of the phase shifter of the second pattern*. Also, since the width of the phase shifter of the mask enhancer structure is optimized in accordance with the close relationship between the patterns, a photomask capable of fine pattern formation with random pattern layout can be realized.

Applicant respectfully submits that Misaka fails to disclose the above identified elements of claim 1. Specifically, none of the figures of Misaka discloses the claimed elements as recited by amended claim 1.

In a photomask shown in FIG. 52 (b) of Misaka, no phase shifter is surrounded by a light shielding portion and the outermost region in each pattern serving as a mask pattern is not a shielding portion. In contrast, in the claimed photomask, “a mask enhancer structure including a

phase shifter ... and a shielding portion surrounding said phase shifter ... , the outermost region in each of said first and second patterns is said shielding portion, and the outmost region of said third pattern is a shielding pattern.” Furthermore, FIG. 52 (b) of Misaka fails to disclose the structure of “the first line width of the phase shifter in the first pattern [being] smaller than the second line width of the phase shifter of the second pattern.” Moreover, in a photomask shown in FIG. 43(h) of Misaka, part of a phase shifter serving as a mask pattern is not surrounded by a light shielding portion and the outermost region in the part of a pattern serving as a mask pattern is not a shielding portion.

Also, in a photomask shown in FIG. 5 of Misaka, phase shifters 42 and 43 are not surrounded by a light shielding portion 41 and the outermost region in each pattern serving as a mask pattern is not a shielding portion. Further, FIG. 5 of Misaka fails to disclose the structure of “a third pattern located adjacent to said first pattern along a direction vertical to the line direction of said first pattern, at a distance not larger than a given distance and with a transparent portion sandwiched between said first pattern and said third pattern” and “the first line width of the phase shifter in the first pattern is smaller than the second line width of the phase shifter of the second pattern” of amended claim 1.

In a photomask shown in FIG. 15 of Misaka, a phase shifter 92 appears to be surrounded by a light shielding portion 91. However, FIG. 15 of Misaka fails to disclose any structure corresponding to the third pattern of claim 1. Further, FIGS. 28 and 29 of Misaka, merely disclose photomasks each having a single mask enhancer structure, but fail to disclose any structure corresponding to the third pattern of claim 1.

As such, it is clear that, at a minimum, Misaka fails to disclose the above identified elements of amended claim 1. Accordingly, claim 1 and all claims dependent thereon are

patentable over Misaka. Thus, Applicant respectfully requests that the Examiner withdraw the rejection of claims 1-4, 11-14 and 16-18 under 35 U.S.C. § 102.

Rejection under 35 U.S.C. § 103

Claims 5-10 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Misaka in view of Ohsaki (US 6,586,168). Claims 19 and 24-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Misaka in view of Pierrat (US 5,718,829). Applicant traverses.

Applicant incorporates herein the arguments previously advanced in traversal of the rejection under 35 U.S.C. § 102(b) predicated upon Misaka. The additional cited references do not teach or suggest the above identified elements of amended claim 1, from which claims 5-7, 16 and 19 depend, which are missing from Misaka. Therefore, any combination of Misaka with Ohsaki and/or Pierrat would still be missing the claimed elements, and it would not have been obvious to add these features to any such combination.

Accordingly, claims 5-7, 15 and 19 are patentable over the cited references for at least the same reasons as claim 1. Thus, Applicant respectfully requests that the Examiner withdraw the rejection of claims 5-7, 15 and 19 under 35 U.S.C. § 103.

New Claims

Since claims 30 and 31 depend upon claim 1, these new claims are also patentable over the cited references for at least the same reasons as claim 1. Further, since none of the cited references disclose or suggest the elements of claims 30 and 31, these claims are patentable for their own merit in addition to the dependency upon claim 1.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicant submits that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicant's attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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